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Dr. Yoji Kondo
Technical Officer
NASA-Goddard Space Flight Center
Greenbelt, Maryland 20771

RE: NAG5-1078 Final Report

Dear Yoji,

This letter is intended as a final report on the NASA-IUE grant NAG5-1078 through the University of Wisconsin-Madison for which I am the Co-Investigator, but had principal responsibility at this institution.

The major direction of the funded work in progress has been to study the characteristics of interstellar extinction in three lines of sight that have large values of total-to-selection extinction, $R_V \equiv A(V)/E(B-V)$. This work has arisen from parallel work on the relationship between optical, near-IR, and UV extinction (Cardelli, Clayton, and Mathis 1988, 1989; CCM) which shows that modification of extinction under different environmental conditions involves all wavelengths in a rather similar way (e.g. all grain sizes appear to be modified as a collection). The analysis of the UV extinction data for the three stars in this program (VCT 10, 30, and Walker 67), in comparison to the results of CCM, have helped extend our understanding of extinction variations to large values of R_V and have brought out some interesting environmental connections.

Analysis of the UV extinction for these three large R_V sight lines have revealed significant deviations from the CCM R_V -dependent average most exclusively for $\lambda < 2500 \text{ \AA}$. This confirms that 1) UV extinction components can vary significantly independent of the CCM extinction law, and 2) the UV components exhibit little or no influence at optical wavelengths: all three sightlines strongly adhere to the CCM R_V -dependent average for $\lambda > 2500 \text{ \AA}$. In addition, the deviations from the CCM R_V -dependent are systematic and strongly dependent on environment. In particular, these sight lines

(NASA-CR-193345) [STUDY OF THE
CHARACTERISTICS OF INTERSTELLAR
EXTINCTION IN THREE LINES OF SIGHT
THAT HAVE LARGE VALUES OF
TOTAL-TO-SELECTION EXTINCTION]
Final Report (Wisconsin Univ.)
2 p

N94-70706

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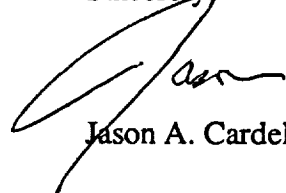
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occur in distinctly dark interstellar cloud lacking bright nebosity. Analysis of other environmentally similar dark cloud sight lines along with sight lines associated with bright nebosity suggests that the deviations from the CCM R_V -dependent extinction law may be associated with the relative presence or absence of coatings on the UV extinction grain components. Such coatings appear to disappear in the presence of bright UV nebosity.

These results have recently appeared in press (Cardelli and Clayton 1991, *A. J.*, **101**, 1021).

Sincerely,



Jason A. Cardelli

Publications related to, or the result of, this work:

Cardelli, J. A., and Brugel, E. W. 1988, *A. J.*, **96**, 673.

Cardelli, J. A., and Clayton, G. C. 1991, *A. J.*, **101**, 1021

Cardelli, J. A., and Savage, B. D. 1988, *Ap. J.*, **325**, 864.

Cardelli, J. A., Clayton, G. C., and Mathis, J. S. 1988, *Ap. J. Lett.*, **329**, L33.

Cardelli, J. A. 1988, *Ap. J.*, **335**, 177.

Cardelli, J. A., Clayton, G. C., and Mathis, J. S. 1988, *A Decade of UV Astronomy with the IUE Satellite*, NASA-ESA, SP-281.

Cardelli, J. A., Clayton, G. C., and Mathis, J. S. 1989, *Ap. J.*, **345**, 245.